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09-23-03

Group Art Unit: 3677  
Examiner: Lugo, C.

Atty. Ref.: USUI-12N

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**  
**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Applicant : Shoichiro Usui  
Appl. No. : 09/731,170  
Filed : December 6, 2000  
For : HIGH-PRESSURE METAL PIPE HAVING CONNECTING HEAD AND  
METHOD OF FORMING THE CONNECTING HEAD AS WELL AS  
SLEEVE WASHER FOR THE CONNECTING HEAD

MS Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

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**BRIEF ON APPEAL**

Sir:

The applicant has appealed the final rejection of claims 5-14. This Brief is submitted in triplicate in accordance with the provisions of 37 CFR 1.192. Please charge our Deposit Account No. 03-1030 for the fee associated with this Brief as well as any additional fees that may be required.

**I. REAL PARTY IN INTEREST**

The real party in interest is Usui Kokusai Sangyo Kaisha Limited.

**II. RELATED APPEALS AND INTERFERENCES**

There are no related appeals or interferences.

**III. STATUS OF CLAIMS**

The application was filed with claims 1-4. Original claims 1-4 were cancelled in

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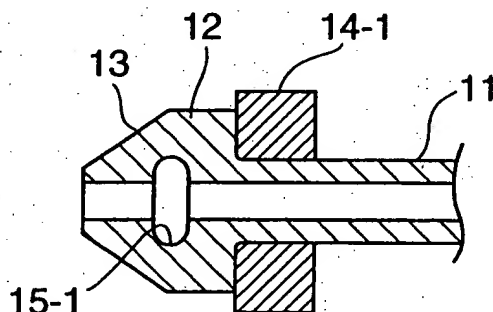
favor of claims 5-14. Each of claims 5-14 remains in the application, and each has been finally rejected. No claims are allowed.

#### IV. STATUS OF AMENDMENTS

No Amendment After Final Rejection has been filed since receipt of the most recent final rejection.

#### V. SUMMARY OF THE INVENTION

The invention relates generally to a thick-walled steel pipe having a connection head at one end (page 1, first sentence). Such pipes are used, for example, as a fuel supply path in a diesel combustion engine (page 1, first sentence). The admitted prior art pipe is shown in the following reproduction of FIG. 6 of the subject application.



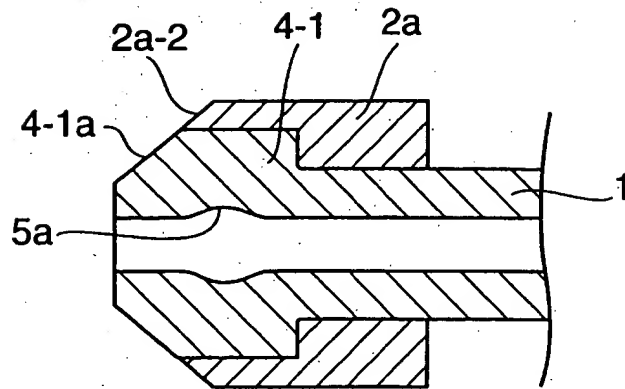
F i g . 6

The admitted prior art connecting head 12 defines a truncated cone with a seat surface 13 (page 1, second paragraph, second sentence and FIG. 6). The connecting head 12 is formed by buckling the pipe under axial pressure applied by a punch (page 2, first full sentence). Thus, a circumferential wall of the connecting head 12 expands outwardly under the axial pressure (page 2, first full sentence). This prior art formation process creates an annular pocket 15-1 with a deep large cross-section around an inner circumferential surface

of the connecting head 12 (page 2, lines 9-12). The deep large annular pocket 15-1 can cause cavitation erosion near the annular pocket 15-1 due to high-pressure fuel that flows during use of the pipe (sentence bridging pages 2 and 3). Accordingly, an area near the pocket 15-1 of the admitted prior art pipe is subject to fatigue-related failures (page 3, line 3).

The subject invention is directed to a high-pressure pipe assembly (claim 1, preamble) intended to solve the risks of cavitation erosion and fatigue failure in the connecting head due to the contour shape of the annular pocket formed in the inside of the connecting head (page 3, lines 7-11). For this purpose, the shape of the annular pocket has a shallow depth and a gentle cross-section (page 3, lines 12 and 13).

The metal pipe has opposite first and second ends (claim 5, line 2) with "a connecting head adjacent said first end" (claim 5, lines 2 and 3). The connecting head has "a seat surface flared outwardly from said first end, a cylindrical surface extending from said seat surface away from said first end and a bearing surface extending inwardly from an end of the cylindrical surface remote from the seat surface" (claim 5, line lines 3-6). The cylindrical surface is defined as having "a selected outside diameter" (claim 5, line 6). A cylindrical body extends from the bearing surface of the connecting head toward the second end of the metal pipe and has an outside diameter less than the selected outside diameter of the cylindrical surface of the connecting head (claim 5, lines 7-9). A passage extends centrally through the metal pipe from the first end to the second end and portions of the passage within the connecting head define an annular groove spaced from the first end (claim 5, lines 9-12; 5a in FIG. 2 reproduced below).



F i g . 2

The high-pressure pipe assembly further comprises "a unitarily formed sleeve washer having opposite first and second ends" (claim 5, line 13; 2a in FIG. 2). A first portion of the sleeve washer extends from the first end toward the second end and has "a first cylindrical inner surface surrounding and closely engaging at least a portion of said cylindrical surface of said connecting head" (claim 5, lines 14-16). A second portion of the sleeve washer extends from the second end toward the first end and has "a second cylindrical inner surface surrounding and closely engaging portions of said cylindrical body adjacent said connecting head" (claim 5, lines 17-19). Additionally, the sleeve washer has "an inner bearing surface extending between said first and second cylindrical inner surfaces and closely engaging the bearing surface of said connecting head" (claim 5, lines 19-21). The sleeve washer additionally has a cylindrical outer surface facing oppositely from said first and second cylindrical inner surfaces and extending substantially from said first end of said sleeve washer to a location aligned with said second cylindrical inner surface of said sleeve washer (claim 5, lines 22-24). The first portion of the sleeve washer defines a first radial thickness and the

second portion of the sleeve washer defines a second radial thickness that is greater than the first radial thickness (claim 5, lines 24-26). An annular outer bearing surface extends substantially orthogonally to said second cylindrical surface and faces the second end of the sleeve washer (claim 5, last two lines).

With the invention set forth in claim 5, "the connecting head can be reduced in diameter" due to "the use of the sleeve washer which covers the outer circumferential surface of the connecting head" (page 6, lines 4-7). Thus, as shown in any of FIGS. 1-5, the overall external dimension of the pipe assembly adjacent the connecting head is defined partly by the connecting head and partly by the sleeve washer. Accordingly, the connecting head, exclusive of the sleeve washer, has a "reduced diameter" (page 5, lines 9-13) as compared to the prior art (e.g., FIG. 6). A connecting head that has a reduced diameter compared to the prior art, also has an annular concave groove that is "shallow in depth and gentle in cross-section" (page 4, lines 2-4). This distinguishes from the prior art which has no sleeve washer (FIG. 6). More particularly, the prior art requires a greater deformation of a connecting head for any selected outside diameter, and hence a deeper annular concave groove that contributes to cavitation erosion (page 5, second full paragraph).

## VI. ISSUES

The first issue on this Appeal is whether the invention defined by any of claims 5, 6, 9 and 12-14 is obvious under 35 USC 103(a) in view of U.S. Patent No. 5,402,829 to Takikawa et al. considered in view of U.S. Patent No. 4,469,356 to Duret et al. It appears that the Examiner intends also to have rejected claim 11 in view of these references.

The second issue on this Appeal is whether the invention set forth in any of claims 7, 8 and 10 is obvious under 35 USC 103(a) in view of Takikawa et al. in view of Duret

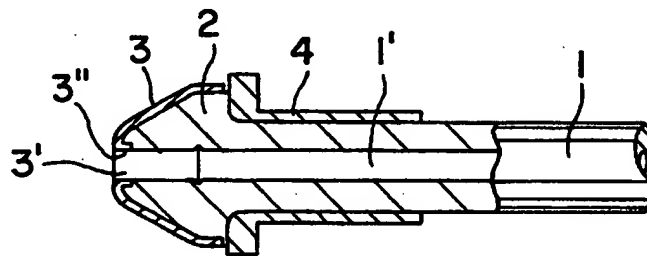
et al. and further in view of Usui, U.S. Patent No. 5,109,888.

## VII. GROUPING OF CLAIMS

It is believed that all of the claims stand or fall together.

## VIII. ARGUMENTS

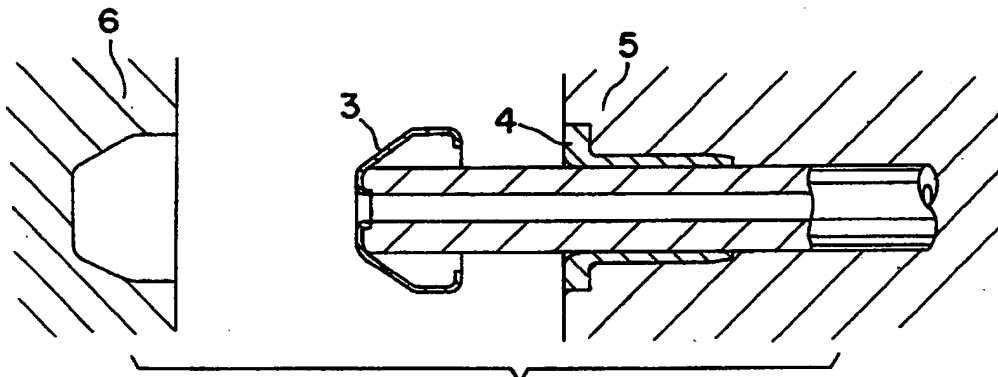
The Takikawa et al. reference is assigned to the assignee of the subject invention, and the applicant herein is familiar with the teaching of Takikawa et al. The connecting head 2 of Takikawa et al. is formed from a pipe 1 that initially is of uniform inside and outside diameter along its length. The formation process of the connecting head of Takikawa et al. creates a distinct crimp on the inner circumferential surface of the pipe near the connecting head, as shown in the FIGS. 1, 2, 4 and 7 of Takikawa et al. The Takikawa et al. structure has a cap collar 3 made from a corrosion-resistant metal material, such as stainless steel, inconel, hastelloy or titanium (col. 3, lines 21-24).



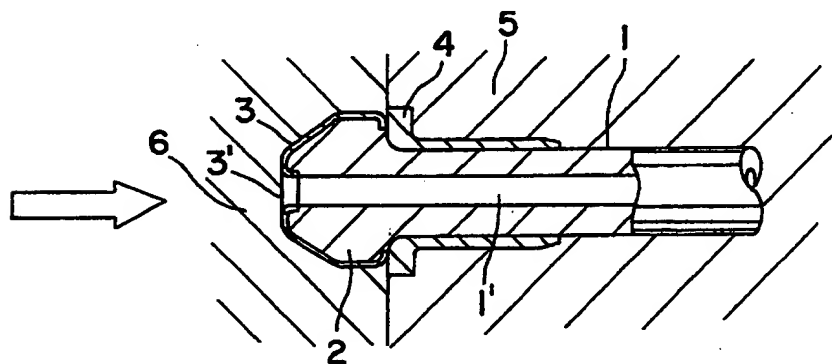
**FIG. 2**

The cap collar 3 is intended to "reduce and prevent the chemical corrosion and the mechanical cavitation erosion on the pressure face including the leading end face of the joint head 2" (col. 4, lines 3-7). Thus, the externally disposed portions of the cap collar 3 are provided for chemical corrosion resistance and corrosion that could occur due to mechanical engagement when the pipe 1 is mated with another fitting.

The Examiner correctly noted that the Takikawa et al. reference also shows a sleeve washer 4 disposed adjacent the rear bearing face of the connecting head of Takikawa et al. However, there is absolutely no suggestion in the Takikawa et al. reference of reconfiguring the dies 5 and 6 of FIG. 5C-D of Takikawa et al. so that a portion of the sleeve washer 4 would extend forwardly from the bearing face of the connecting head.



**FIG. 5C**



**FIG. 5D**

An extension of the sleeve washer 4 forward and over the cap collar 3 could prevent the cap collar 3 from performing its primary function of resisting chemical corrosion. Accordingly, Takikawa et al. would not want the sleeve washer 4 to extend over the expensive metal of the cap collar 3. Conversely, there is nothing in Takikawa et al. that would suggest a complicated

structure with the cap collar 3 somehow overlying both the connection head 2 of the pipe 1 and a forward extension of the sleeve washer 4. The sequence of manufacturing steps shown in FIGS. 5A-5D of Takikawa et al. shows that the connection head 2 is formed by bulging out the pipe 1 to fill the preformed cap collar 3. Thus, the bulged out connection head 2 will engage the inwardly directed preformed lip at the rear end of the cap collar 3 for retaining the cap collar 3 in position on the connection head 2, as shown in FIGS. 5C and 5D above. It is not seen how the cap collar 3 of Takikawa et al. could possibly be reconfigured to surround a portion of a sleeve washer 4 that hypothetically would extend forwardly into surrounding disposition relative to the enlarged head 2 of the pipe 1. Certainly no such redesign is suggested.

The Duret et al. reference was cited in an effort to overcome the acknowledged deficiencies of Takikawa et al. The specification of the Duret et al. reference emphasizes the importance of a light weight for the elements of the disclosed connecting device (Duret et al., col. 1, lines 12-27). The sleeve 14 of Duret et al. is of uniform thickness along its length and is deformed simultaneously with the end of the pipe 16 so that the sleeve 14 and pipe 16 follow the same contours. The cross-section of the Duret et al. reference clearly indicates that the Duret et al. reference is not at all concerned with internal surface irregularities that could create turbulence or cavitation-related failures. This internal configuration further emphasizes that the Duret et al. reference is intended for a low-pressure environment. The sleeve 14 of the Duret et al. reference clearly does not have an outer cylindrical surface that is aligned with both first and second inner cylindrical surfaces. Rather, the sections of the Duret et al. sleeve that the Examiner would consider to be the first and second inner cylindrical surfaces align respectively with first and second different outer cylindrical surfaces so that a uniform

thickness of the sleeve 14 exists along the entire length of the sleeve.

The Duret et al. reference also is silent with respect to the problem addressed by the subject invention and certainly is silent with respect to solutions to that problem. The drastic changes of the internal cross-section would generate the cavitation-related failures that the subject invention addresses. Furthermore, the Duret et al. reference describes in considerable detail (col. 2, lines 16-31) how to form those internal dimensional changes. Thus, there is certainly no reason why the skilled artisan would contemplate a redesign to avoid the integral dimensional changes that are an internal part of the Duret et al. teaching.

To support an obviousness rejection, there must be something in the references that would motivate the skilled artisan to combine the references. *In re Dembiczak*, 50 USPQ2d 1614 (Fed. Cir. 1999). In this instance, the Takikawa et al. reference clearly is directed to a high-pressure environment that is relevant to the subject matter of the claimed invention. The Duret et al. reference, on the other hand, clearly is directed to a low-pressure environment. People skilled in this art unquestionably understand that structures that are suitable for a low-pressure environment are not adaptable to a high-pressure environment. Thus, the skilled artisan would not be motivated to pick and choose separate components of low-pressure connectors for incorporation into a high-pressure fluid connector.

It is submitted that the invention defined by claim 5 on appeal clearly is patentably different from the hypothetical Takikawa et al./Duret et al. combination. In particular, the hypothetical combination would have the uniformly thick Duret et al. sleeve 14. There is no way that the hypothetical combination of Takikawa et al. and Duret et al. would lead to a sleeve washer with first and second inner cylindrical surfaces and an outer cylindrical surface aligned with portions of both the first and second inner cylindrical surfaces

as in claim 5 on appeal. This claimed structure simply is not shown in the hypothetical Takikawa et al./Duret et al. combination.

The Examiner appears to have appreciated this deficiency in the hypothetical combination and has attempted to address that deficiency with an inappropriate reference to *in re Dailey* and a summary statement that "a change in the shape of a prior art device is a design consideration within the level of skill of one in the art." In fact, the above-quoted section of the Official Action is not consistent with the holding of *in re Dailey*. Rather, the Court of *in re Dailey* held:

"Appellants have presented no argument which convinces us that the particular configuration of their container is significant or is anything more than one of numerous configurations a person of ordinary skill in the art would find obvious for the purpose of providing mating surfaces in the collapsed container of [the prior art reference]."

Here, the entire application and the arguments presented above clearly do explain why "the particular configuration... is significant." For the reasons explained above, the particular configuration set forth above clearly is not "one of numerous configurations a person of ordinary skill in the art would find obvious."

In this instance, claim 5 on appeal quite clearly defines a structure that is different from anything shown in the references, individually or in combination, and achieves a significant advantage in view of these differences. It is submitted that the Examiner has inadvertently leaped to a conclusion of obviousness based on hindsight gained from the teaching of the applicant herein. *In re Dembiczak*, 50 USPQ2d 1614 (Fed. Cir. 1999), *McGinley v. Franklin Sports Inc.*, 60 USPQ2d 1001 (Fed. Cir. 2001). This is an inappropriate application of 35 USC 103. For these reasons, it is submitted that the invention defined by

claim 5 on appeal and its dependent claims 6, 9 and 12-14 is not taught or suggested by Takikawa et al. in view of Duret et al.

Claims 7, 8 and 10 were rejected under 35 USC 103(a) as being obvious over the above-described Takikawa et al. reference considered in view of the above described Duret et al. reference and considered further in view of U.S. Patent No. 5,109,888 to Usui. The Usui reference also is assigned to the assignee of the subject invention. Usui considers problems relating to cavitation erosion due to the annular groove created as the connection head is formed. The assignee's Usui reference utilizes a metallic ring embedded in the connection head. In this regard, the pipe first is flared outwardly as shown in FIG. 3. The metal ring 6 then is inserted into the flared end and the pipe is further deformed to surround the metal ring. The Usui reference was not cited for the internal configuration, but rather to merely show a spherically generated head. Counsel and the applicant do not dispute that spherically generated heads are known. However, it is believed that the Usui reference, is very significant to support novelty and inventiveness. In particular, Usui has recognized and considered the problems addressed by the invention of the claims on appeal herein. However the assignee's earlier Usui reference addresses cavitation-related erosion by forming the connecting head around a metallic ring member that "is consequently buried as positioned in annularly grooved part 5" so that there is "formed a connecting head part to possessing a flat smooth inner peripheral surface". Thus, Usui would seem to teach away from the invention.

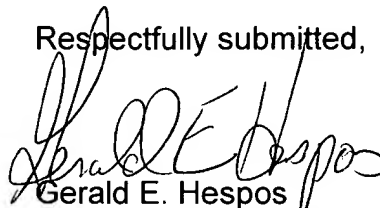
In contrast to the assignee's earlier efforts to deal with cavitation erosion, the subject invention employs a uniquely configured sleeve washer with "a first cylindrical inner surface surrounding and closely engaging at least a portion of said cylindrical surface of said connecting head." The sleeve washer further has "a cylindrical outer surface facing oppositely

from said first and second cylindrical inner surfaces and extending substantially from said first end of said sleeve washer to a location aligned with said second cylindrical inner surface of said sleeve washer." As a result, the claimed assembly can have specified external dimensions sufficient to mate with another fitting and sufficient to achieve the required strength for a high pressure connection, but without excessive deformation of the pipe 1 during the formation of the connection head 4. Thus, whereas the assignee's earlier Usui reference dealt with cavitation-related failures by structures on the interior of the pipe, the subject invention addresses internally-generated cavitation-related failures by structures on the exterior of the pipe. The prior art has no suggestion of using a sleeve washer on the outside of a pipe to address cavitation-related failures produced on the inside of the pipe.

For a rejection under 35 USC §103, the examiner is required to provide a reason from some teaching, suggestion or implication in the prior art as a whole, or knowledge generally available to one of ordinary skill in the art, why one having ordinary skill in the pertinent art would have been led to modify the prior art to arrive at the claimed invention. *Uniroyal, Inc. v. Rudkin-Wiley*, 837 F.2d 1044, 1052, 5 USPQ2d 1434, 1438 (Fed. Cir. 1988), cert. denied, 488 U.S. 825 (1988). These showings by the Examiner are an essential part of complying with the burden of presenting a *prima facie* case of obviousness. Note *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). Furthermore, "[o]bviousness may not be established using hindsight or in view of the teachings or suggestions of the inventor." *Para-Ordnance Mfg., Inc. v. SGS Importers Int'l., Inc.*, 73 F.3d 1085, 1087, 37 USPQ2d 1237, 1239 (Fed. Cir. 1995), citing *W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1551, 1553, 220 USPQ 303, 311, 312-13 (Fed. Cir. 1983). It is believed that the skilled artisan would not be motivated to combine the thin-tube technology of

Duret et al. with either Takikawa et al. or Usui. Furthermore, as explained above, that hypothetical combination is still deficient with respect to the claims on appeal. Accordingly, it is believed that all of the claims on appeal are directed to patentable subject matter. Accordingly, the Board is urged to reverse the final rejection.

Respectfully submitted,



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